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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,611	07/28/2003	Hiroshi Watanabe	402721	4283
23548	7590	03/14/2006		
LEYDIG VOIT & MAYER, LTD 700 THIRTEENTH ST. NW SUITE 300 WASHINGTON, DC 20005-3960			EXAMINER KAO, CHIH CHENG G	
			ART UNIT 2882	PAPER NUMBER

DATE MAILED: 03/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/627,611

Applicant(s)

WATANABE ET AL.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-13 is/are allowed.
- 6) ☒ Claim(s) 9, 10 and 14-18 is/are rejected.
- 7) ☒ Claim(s) 2-8 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claims 2-8 and 19 are objected to because of the following informalities, which appear to be minor draft errors including grammatical and/or lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s): (claim 7, line 7, “the phase shift”; replacing “the” with - -a- -), (claim 7, line 7, “the X-rays transmitted”; deleting “the”), and (claim 7, line 8, “the transmittance”; deleting “the”).

Claims 2-6, 8, and 19 are objected to by virtue of their dependency. For purposes of examination, the claims have been treated as such. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 9, 10, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyake et al. (JP 09-043829).

3. Regarding claim 9, Miyake et al. discloses a method comprising forming an X-ray transmitter (fig. 2, #1), forming a first X-ray absorber (fig. 2, #3) opposite said X-ray transmitter

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(fig. 2, #1), said first X-ray absorber (fig. 2, #3) including a plurality of spaced apart first X-ray absorber portions having a first width (fig. 2, #3), and forming a second X-ray absorber (fig. 2, #2), on said first X-ray absorber (fig. 2, #3), said second X-ray absorber (fig. 2, #2) comprising a plurality of second X-ray absorber portions spaced from each other (fig. 2, #2), respectively disposed on corresponding first X-ray absorber portions (fig. 2, #3) so that a first X-ray absorber portion (fig. 2, #3) is interposed between said X-ray transmitter (fig. 2, #1) and a respective second X-ray absorber portion (fig. 2, #2), each second X-ray absorber portion having a second width (fig. 2, #2), different from the first width (fig. 2, #3).

4. Regarding claim 10, Miyake et al. further discloses wherein the first width of said first X-ray absorber portions (fig. 2, #3) is larger than the second width of said second X-ray absorber portions (fig. 2, #2).

5. Regarding claims 17 and 18, Miyake et al. further discloses wherein said laminated X-ray absorber has a layer containing chromium (paragraph 19).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al. as applied to claim 9 above, and further in view of Lee et al. (US Patent 6534221).

Miyake et al. discloses a method as recited above. Miyake et al. further discloses wherein tungsten (paragraph 29) is employed as one of said first X-ray absorber and said second X-ray absorber, and carbon (paragraph 29) is employed as the other of said first X-ray absorber and second X-ray absorber.

However, Miyake et al. fails to specifically disclose diamond as an absorber.

Lee et al. teaches diamond as an absorber (col. 5, lines 8-9).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Miyake et al. with the diamond absorber of Lee et al., since one would be motivated to make such a modification for increasing the life of a device (col. 6, lines 29-31) as implied from Lee et al. Furthermore, it would have been obvious and within the general skill of a worker in the art to select a known material on the basis of its suitability.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al. as applied to claim 9 above, and further in view of Maehara et al. (US Patent 5870448).

Miyake et al. discloses a method as recited above.

However, Miyake et al. fails to specifically disclose forming an etching stopper film, stopping etching when etching a first X-ray absorber on an X-ray transmitter, and forming a second X-ray absorber on said etching stopper film.

Maehara et al. teaches forming an etching stopper film (fig. 1f, #104a), stopping etching when etching a first X-ray absorber (fig. 1f, #105b) on an X-ray transmitter (figs. 1a and 1f, #102), and forming a second X-ray absorber (fig. 1f, #106b) on said etching stopper film (fig. 1f, #104a).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Miyake et al. with the etching stopping film of Maehara et al., since one would be motivated to make such a modification for protecting the X-ray transmitter (figs. 1A-1L) as implied from Maehara et al.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al. as applied to claim 9 above, and further in view of Sentoku et al. (US Patent 5553110).

Miyake et al. discloses a method as recited above.

However, Miyake et al. fails to specifically disclose forming an interlayer film as an etching stopper or a hard mask on a first X-ray absorber, and forming a second X-ray absorber on said interlayer film.

Sentoku et al. teaches forming an interlayer film (fig. 13f, #164) as an etching stopper or a hard mask on a first X-ray absorber (fig. 13f, #163), and forming a second X-ray absorber (fig. 13f, #165) on said interlayer film (fig. 13f, #164).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Miyake et al. with the interlayer film of Sentoku et al., since one would be motivated to make such a modification for lowering noise (col. 21, lines 13-15) as implied from Sentoku et al.

*Allowable Subject Matter*

9. Claims 2-8 and 19 would be allowable if rewritten or amended to overcome the claim objections(s) set forth in this Office action. Claims 11-13 are allowed. The following is a statement of reasons for the indication of allowable subject matter.

10. Regarding claim 7, prior art fails to disclose or fairly suggest a method including forming a laminated X-ray absorber on a surface of an X-ray transmitter, but not in recesses, wherein said laminated X-ray absorber includes at least two layers having different compositions, wherein a phase shift of X-rays transmitted through said X-ray absorber is in a range of  $0.3\pi$  to  $0.6\pi$  and transmittance of the X-rays transmitted through said X-ray absorber is in a range of 30% to 60% for X-rays having an average exposure wavelength longer than 0.3 nm and shorter than 0.7 nm, in combination with all the limitations in the claim. Claims 2-6, 8, and 19 contain allowable subject matter by virtue of their dependency.

11. Regarding claim 11, prior art fails to disclose or fairly suggest a method including carrying out an exposure with an X-ray mask having a geometric X-ray phase difference between a phase of X-rays transmitted through an X-ray transmission part of said X-ray mask and a phase of X-rays transmitted through an X-ray absorber of said X-ray mask in a range including  $0.5\pi$  and in proximity to  $0.5\pi$ , wherein a laminated structure includes at least two layers having different compositions, and either a phase shift of the X-rays transmitted through said X-ray absorber is in a range of  $0.3\pi$  to  $0.6\pi$  or the transmittance of the X-rays transmitted through said

X-ray absorber is in a range of 30% to 60%, in combination with all the limitations in the claim. Claims 12 and 13 are allowed by virtue of their dependency.

### ***Response to Arguments***

12. Applicant's arguments with respect to claims 9, 10, and 14-18 have been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments filed 2/23/06 have been fully considered but they are not persuasive.

Regarding claim 9, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., absorber portions stacked on each other, i.e., serially arranged, with respect to the X-ray transmitter) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Applicant further argues that Miyake et al. fails to disclose two X-ray absorbers. The Examiner disagrees. As seen in claim 2 of Miyake et al., the phase shifter is also made of material that can absorb radiation. Therefore, Miyake et al. does disclose two X-ray absorbers.

In conclusion, Applicant's arguments are not persuasive, and the claims remain rejected.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



gk



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